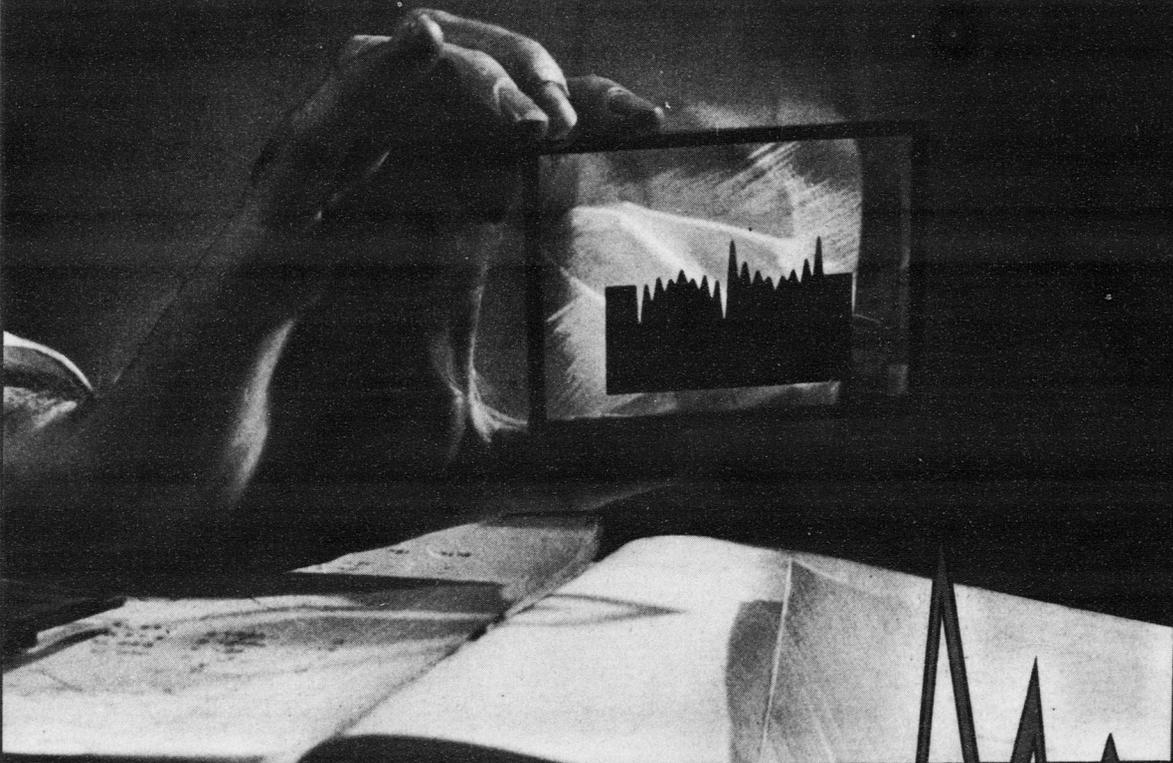


Waveform Analysis

Function Generator-Fourier Analyzer



see overleaf

Biological Waveform Analysis

A new experimental device, the "function generator-fourier analyzer," provides analysis of complicated waveforms, such as electrocardiograms, electrokymograms, and blood pressure recordings, in minutes instead of days. The analyzer uses electronic methods to analyze biological waves important in diagnosis and research.

In developing the apparatus, two scientists with the National Heart Institute, National Institutes of Health, Public Health Service, combined modern electronics with a mathematical concept originated by Baron Jean Baptiste Joseph Fourier, a 19th century French geometrician and physicist. Fourier developed a method of expressing complicated curves in terms of simple component sine functions. This method combined with electronics allows analysis of the frequency, amplitude, and phase relationships of the harmonic components which make up biological recordings.

A photoelectric feedback system forces a cathode ray beam to follow the edge of the waveform. The signal generated in this process is the electrical equivalent of the wave-

form. This signal is connected to a wave analyzer, which breaks down the signal to its component parts. This analysis is presented on a second cathode ray tube. The analysis is a precise physical description of the original waveform.

The analyzer may eventually be a timesaving aid to physicians in the precise classification of various readings taken on patients with heart and blood vessel diseases. Its most immediate application, however, is in providing help in improving instruments now being used for recording waveforms.

One possible inadequacy of a number of biological wave recording instruments is that they may not fully cover the frequency spectrum of the waveform and consequently will not give a truly accurate recording. On the other hand, the instrument may have a range greater than necessary for the particular waveform it is recording, and therefore be more complex and expensive than necessary. The analyzer will obtain information to indicate just how elaborate an instrument is needed to produce an ideal recording of a particular type of waveform.

frontispiece...

The pattern on the slide is a test wave of a known formula used to determine the accuracy of the analyzer. The test pattern is processed in the analyzer and the results are compared with the known formula.

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